

REMARKS

Reconsideration and allowance are respectfully requested.

Claims 1-75 stand rejected (non-final); claims 76-102 have been withdrawn. The independent claims are 1, 14, 24, 31, 40, 49, 57, 65, and 70.

One issue remains: obviousness type double patenting.

The applicants appreciate the examiner's examination to date including the telephone interview (see form PTOL-413 dated October 20, 2006) wherein the substance of the remaining obviousness type double patenting issue was reviewed. The applicants appreciate the Examiner's reconsideration of this issue and incorporate by reference their prior remarks on this subject in the last response. While the applicants traverse the obviousness type double patenting rejection, the applicants may also be willing to file a terminal disclaimer as needed, and a telephone interview with the undersigned is respectfully requested if a terminal disclaimer is believed needed.

Claims 1-75 of the instant application were rejected on the grounds of non-statutory obviousness-type double patenting as being unpatentable over claim 1 of Mirkin et al. (6,635,311) in view of Nakata et al. (5,246,609), Nanao et al. (4,668,299) and Zhang et al. (US 2005/0255237A1). The applicants respectfully traverse.

While the text of each of the pending claims must be considered on its own merit, the present independent claims generally relate to use of tips to pattern magnetic precursors and form magnetic nanostructures. For example, independent claim 1 recites a two step process involving depositing and converting:

*I. A method of forming a magnetic nanostructure comprising:
depositing a magnetic nanostructure precursor on a substrate from a nanoscopic tip;
and
converting the precursor to form the magnetic nanostructure on the substrate.*

Other independent claims relate to, for example, hard magnetic embodiments (claim 14), soft magnetic embodiments (claim 24), sol gel embodiments (claim 31), array embodiments (claim 40), ferromagnetic embodiments (claim 49), precursors (claim 57), reactive inks (claim 65), and solid state magnetic (claim 70). The Examiner should consider the merits of these claims on their own.

The inventors of the present application faced problems related to fabrication of magnetic, small-scale structures. For example, the specification background states:

Improved methods are needed to pattern small magnetic structures including nanostructures. The methods should be convenient, versatile, and provide high resolution and alignment. Methods should be applicable to magnetic materials which are difficult to process. (specification: page 2, bottom paragraph)

In stark contrast, claim 1 of the primary reference, Mirkin, is silent about magnetic structures and use of precursor routes to form magnetic structures. It simply reads:

A method of direct-write nanolithography, comprising: providing a solid substrate comprising a gold surface; providing an atomic force microscope tip coated with sulfur compound; and contacting the coated tip with the substrate, so that the sulfur compound is delivered to the substrate so as to produce a desired pattern in submicrometer dimensions. (emphasis added)

Hence, the differences between the pending claims and the Mirkin claim 1 are large and material, and reflect both structural and functional differences. One of ordinary skill in the art facing the problems facing the present inventors would not turn to claim 1 in Mirkin. In construing the meaning of the Mirkin claim 1, the applicants note that Mirkin describes a wide variety of materials can be patterned, but it does not expressly describe that magnetic sulfur compounds and precursors thereof can be patterned. Mirkin only briefly notes that substrates can be magnetic (col. 5, lines 59-61). An important functional difference is that Mirkin claim 1 describes only a single action step of contacting and does not describe or suggest a conversion step. In sum, Mirkin's claim 1 is patentably distinct from the present claims.

The Examiner's resort to the three secondary references does not support the obviousness type double patenting conclusion. For example, no motivation to combine references is present, and the Examiner appears to have not considered the full teachings of the cited references and motivation to not combine references.

First, Nakata relates to fine magnetic particles. However, Nakata, does not describe anything about use of tips, or nanoscopic tips, or AFM tips for deposition on a substrate. Nakata does not describe sulfur patterning compounds. Nakata merely describes formation of fine particles but in no way describes or suggests anything other than conventional processing of these particles. Nakata does not show how the sulfur compounds of claim 1 would be used for magnetic applications as Nakata does not relate to sulfur compounds. Hence, one skilled in the art faced with a problem of forming nanostructures on substrates would not turn to Nakata or combine it with Mirkin claim 1 as Nakata merely describes making particles and subsequent conventional processing.

Similar arguments also apply for the secondary reference, Nanao, which similarly only teaches magnetic particle synthesis as is resorted to for its teaching on magnetic hardness. There is no teaching in Nanao as to how one would use the materials of Nanao with a tip (or nanoscopic tip, or AFM tip) and form magnetic nanostructures therewith. Nothing is suggested about use of sulfur patterning compounds. Nanao does not show how the sulfur compounds of claim 1 would be used for magnetic applications as Nanao does not relate to sulfur compounds. Hence, again, one skilled in the art faced with a problem of forming nanostructures on substrates would not turn to Nanao or combine it with Mirkin claim 1.

Finally, the Examiner cites to Zhang for sol gel teachings but does not refer to the applicant's effective filing date or Zhang's effective filing date. Zhang generally describes use of polymer coatings on tips to improve deposition but does not particularly relate to magnetic applications. Zhang was filed after the present application and briefly refers to the present application in the form of a PCT counterpart (see paragraph 332), which is its only recitation to magnetic applications. However, Zhang is not prior art for that disclosure as the present filing date of September 13, 2003 (with priority claim to September 17, 2002) predates Zhang's reference to the present application PCT counterpart (which earliest would

be February 13, 2004 in provisional 60/544,260). The Examiner also refers to Zhang's teachings for sol-gel inks, but does not show how Zhang teaches an equivalency between sulfur patterning compounds and sol-gel inks, or how sol gel inks would lead to magnetic structures. Sol-gel ink is a reactive ink and is metal oxide based and usually not sulfur based ink. In sum, Zhang does not support the double patenting and is not even prior art for its magnetic application teaching.

To reiterate, the difference between claim 1 of Mirkin's 6,635,311 and those of the instant application (1-75) are vast and do not allow one to conclude they are patentably indistinct. Particularly important differences include the functional and compositional differences between the "sulfur compound" of the reference and the magnetic material precursors of the instant application and the one step versus two step approach. Therefore, the two cannot be simply interchanged absent any additional teaching, which has not been shown. Resort to the secondary references has not contributed to the obviousness assertion. As such, one of ordinary skill in the art, even in view of the secondary referenced cited, would not have found motivation to arrive at every claimed element of the present invention. The suggested combinations would also suffer from lack of reasonable expectation of success due to the deficiencies noted.

In sum, applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or any other rule, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any additional extension of time is needed for timely acceptance of papers submitted herewith, Applicant

hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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By



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